

When people find out I'm an Information Technology consultant for small businesses, they usually react in one of two ways. The first reaction is a disinterested sounding "Oh" followed by an immediate change of subject. The second reaction is lobbing a technical question my way about a person's home or office PC. Many of the questions I'm asked center around how to decide whether buying a new computer or upgrading a current one is best, and if buying new, how to decide what kind of computer will meet their needs.

After many years of talking to people, I've concluded that most of them understand things like video, audio and printers fairly well. What is often confusing to people are three basic PC components, 1) hard drive, 2) processor and 3) memory or RAM (Random Access Memory). I'm going to share an analogy I use when explaining what these three components do in a PC and how they interact with each other. I can't take credit for coming up with it, but over the years I've adapted it and sort of made it my own.

Picture yourself sitting at a desk working. The PC's hard drive would be like the file drawer in the desk, because it's where we store information when it's not being used. The more file drawers we have and the bigger they are, the more files we can store in them. On a PC, the size of the hard drive tells us the amount of storage space we have for our electronic files. These days the hard drive (or drives - we may have more than one) on a new PC might be between 250GB (Gigabytes) and 500GB, which is enough room for a half a million photos, about a hundred thousand songs, or over a hundred full length movies.

So far, the analogy is probably pretty obvious, but it goes a little deeper because a computer has to deal with two hard drive related things that you don't have to worry about with your file drawer. The first is file fragmentation. When you add a file to your file drawer, you can add it to middle of the drawer by moving other folders out of the way so the drawer stays organized either alphabetically or by topic or by whatever system you are using. A PC's hard drive stores data wherever there is open space and its file system (in Windows this is called NTFS) keeps track of where all the pieces of the file are stored and then retrieves them and assembles them when you open the file.

When this happens on a hard drive, we say the files are fragmented. If it sounds like having fragmented files might slow down your PC, you're very perceptive because that is exactly what happens. That's why we can improve performance by defragmenting our hard drives regularly, say once a week or once a month depending on use.

The second thing a PC's hard drive has that we might not normally think of a file drawer having is a speed rating. If your file drawer was limited in how fast it would open, this might decrease the amount of work you could do. On a PC, the faster the drive, the faster we can save files to it and retrieve files from it.

If we've exhausted the comparison between hard drives and file drawers, the next PC component we need to discuss is the processor. The processor would be like you, the person sitting at the desk, because it's what actually does the work. Obviously, the faster you are, the more work you can get done. The processor's speed tells us how fast it is. All else being equal, a 3.2GHz (Gigahertz) processor will work faster and therefore get more work done than a 2.8GHz processor.

Two concepts complicate our analogy here. The first is that a PC can have more than one processor. Of course, that would be like two people working at one desk and would increase considerably the amount of work that could be done at the desk. These days you might hear the term "dual core" being used to describe PC processors. This is like having Siamese twins sitting in a single chair at the desk. As long as you had two sets of hands and two independent brains, you'd have almost all the benefits of having two

people working at your desk. Similarly, dual core processors are almost like having two processors in a single PC.

The second processor concept is that of processor cache. Think of cache like extra hands that can hold something you'll need in a few seconds so that you don't have to put it down on the desk. Although these hands are incapable of actually doing work themselves, they provide you with quicker access to information you are working on, and you end up working more quickly, right? In the same way, it's possible for a 2.8GHz (Gigahertz) processor with lots of cache to be faster than a 3.2GHz processor without much cache.

We've talked about hard drives and processors, and that brings us to the last part of the analogy - memory. Like a hard drive, memory is a storage area for data and is measured in MB or GB. But unlike a hard drive, memory is where we put data when we are using it. At our desk, we take something out of the drawer when we need to work on it, and we place it on the top of our desk. When we open files on our PC, we read them from the hard drive into memory, so memory is like the top of our desk. These days, it's not uncommon to buy a PC with 1GB, 2GB or even 4GB of memory, so how do we decide how much memory we need? The biggest consideration here is the kind of work we'll be doing.

If we're writing a letter at our desk we need very little desk space, just enough for the paper itself, the envelope we'll put the letter in, a stamp and room to set our pen down. On the other hand if we're going to be working on something like a scrapbook, we'll need a much larger area on the top of our desk, so we can spread out photos and pages and books and scissors and all the other tools that are used in scrapbooking. In case you're wondering, my wife happens to own many of these tools and I've seen them spread out on a table - an entire table!

As with working at our desk, PC documents consisting mainly of text take up very little room in memory. Any time we're working with photos or video (especially video games), we're going to need a lot more, so use this basic principle to guide you in how much memory you need in your PC. Also remember that memory is one of the easiest and least expensive ways to upgrade an existing PC. If you have any mechanical aptitude at all, you can buy and install memory yourself, so don't feel as though you need to overspend on memory in a new PC if you're on a budget. If you think you need more memory on an existing PC, I recommend using the system scanner tool at www.crucial.com.

Hopefully, we have a fundamental understanding of the three PC components of hard drive, processor and memory. The next thing I want to do is mention a couple of ways in which these components interact with each other. To describe the first, let me take you back to the scrapbooking example I brought up before. We need desk space not only for the scrapbook we are working on, but also for all the tools we use to work on it. As I mentioned, scrapbooking tools take up much more room than a pen, a stamp and an envelope.

In the same way, when we're done working on the scrapbook and ready to store it away again, we are storing not only the scrapbook itself, but also all of our scrapbooking tools in a drawer in our desk. On a PC, the tools we use are software tools and they stored on the hard drive along with our documents. Graphics programs tend to occupy much more space on a hard drive than other types of software.

Here's another. What happens when we have so many different things to work on that we run out of space on our desk? We can always put the least necessary items back in our desk drawer to make room for something more important. If we had a folder right in the front of our desk drawer labeled "In Use",

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we could even put those less necessary things there temporarily so we wouldn't have to take the time to file them. Then when we were ready to work on them again, we could put them back on the top of our desk. A PC keeps an area on its hard drive called the pagefile for this same purpose. You can see this file (called pagefile.sys) on the C drive of most PCs running Windows Vista or XP if you enable the viewing of hidden files.

On one hand, this provides us with some reassurance that we won't have things falling off the desk if we get really busy. On the other hand, retrieving files from a desk drawer because we don't have enough space on our desk isn't very efficient. Not only are these files farther away when we need them, moving things between the desk drawer and the desktop all the time is more work for you to do when you're already busy! On a PC, we can actually have a situation where the processor has to work harder because there isn't enough memory and the files need to be moved in and out of the pagefile constantly.

I hope this background knowledge of PC components helps out when trying to decide whether to keep that old PC or what to look for in a new one. Let me leave you with one last thought. Ever walk into your office and have trouble finding space to put something down because your desk is so cluttered? Well, read my next article to find out how to discover what clutters up the memory on your PC, and how to unclutter it!